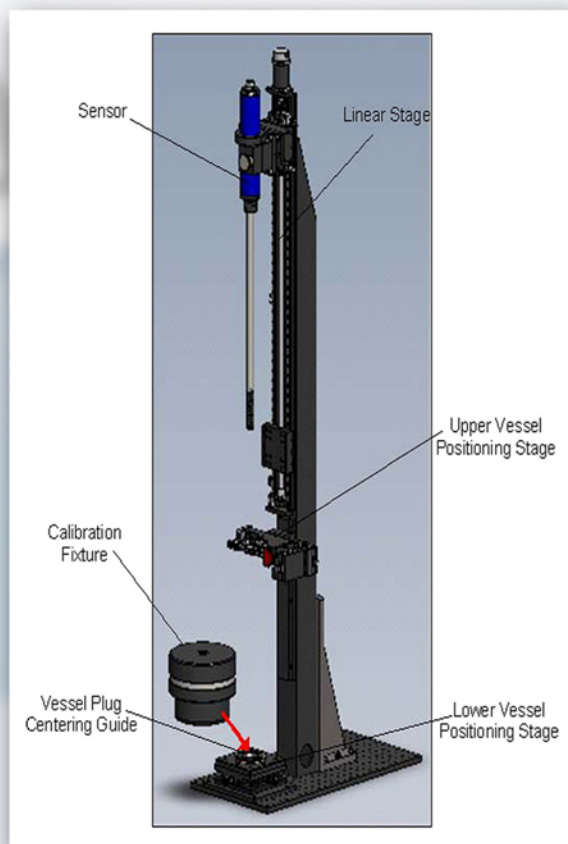


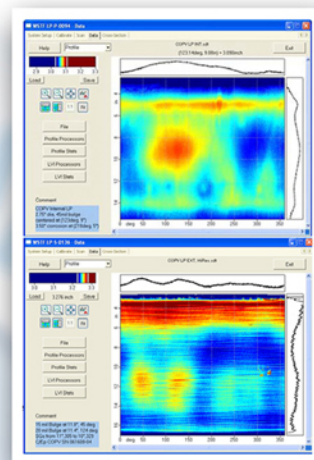


# Innovation @ WSTF 2011

## Development of a COPV Profilometry and Eddy Current Scanning System



WSTF Cylindrical COPV Mapping System



Internal cylindrical scan showing distortions (top) and external scan of the same vessel (bottom)



Eddy current scan of liner defect standard

A nondestructive evaluation (NDE) system was recently developed by the White Sands Test Facility (WSTF) and NASA NDE Working Group (NNWG) to inspect composite overwrapped pressure vessels (COPVs) and provide an analytical tool to understand mechanical responses of the vessel. The system consists of an internal and external laser profilometer and eddy current (EC) scanner and can be used both during the manufacturing process and as a part of test programs. The COPV scanning station consisted of several positioning stages, a vessel centering guide, and a calibration fixture traceable to the National Institute of Standards and Technology (NIST).

The basic system was recently modified to retain the internal profilometry capability. It can also be reconfigured for external profilometry and EC scanning by removing the interior sensor probe and replacing it with offset external probes. A rotational stage is also used to spin the bottles or liners for EC and external profile scans. This makes it uniquely applicable to in-process manufacturing support since it has the ability to scan vessel liners, while ensuring critical cracks and other EC-detectable defects do not exist. It also provides an accurate profile map of the interior and exterior after wrapping and testing.

The profilometry systems are designed to provide data accurate to  $\pm 0.001$ -in. This allows accurate evaluation of any pits, bulges, and distortion, while evaluating the amplitude and periodicity of any liner buckles or anomalies. The EC system has detected surface defects  $\sim 0.001$ -in. deep in aluminum liners. A current project is underway to add sensors to evaluate internal cracks as well as liner cracks through the composite (after wrapping). The flaw detection sensitivity will be less in the new modes and will be quantified using physical standards. More information is available on the NNWG website (<http://nnwg.org/current/WSTF/copv.html>).

